

Remarks

Applicants thank Examiner Ngo for the careful examination of this application and the clear explanation of claim objection and rejection, and for allowing claims 1-11 and 28. In response to the Office action, applicants amend claim 29 to overcome the 102(e) rejection and amend claim 30 to overcome the antecedent-defect.

Claim 29, as amended, limits the semiconductor device to include a copper bonding pad, a seed layer contacting the bonding pad and with the edge portion of the seed layer overlapping the insulating layer near the window in the insulation layer. The overlapping portion is further limited to be substantially parallel the bonding pad. Contrarily, the Cunningham reference does not disclose such limitations.

1. The system disclosed in the Cunningham reference does not concern with copper bonding pads but rather with a Damascene-type copper interconnects.¹ The element 3 in Cunningham is a lower level metal interconnect of a Damascene-type interconnect system instead of a bonding pad.
2. The element 12 is another copper interconnect one level above the element 3. It is well known in the art of semiconductor device manufacturing that a Damascene-type copper interconnect is confined in a trench and with a top surface coplanar with the top surface of the insulation layer in which the copper interconnect is embedded, as depicted in Figs. 1 – 6 of the Cunningham reference. The side of the copper interconnect 3 and 12 are in contact with the seed layers 4 and 11.
3. Cunningham does not disclose an edge portion of the seed layer overlapping the insulating layer near the window. First, this limitation is not disclosed in the reference. Second, because of the co-planarity of the top the copper interconnect and the insulating layer in which the copper interconnect is embedded, as explained in the prior paragraph, no seed layer is left on the surface of the insulating layer at the completion of the Damascene-type interconnect system.

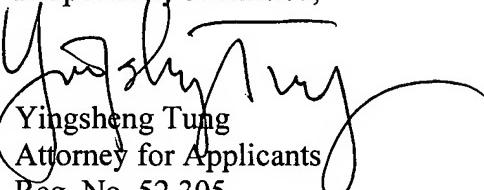
¹ US 2004/0238961 A1, [

Appl. No. 10/678,709
Amdt. dated Mar. 8, 2005
Reply to Office action of Dec. 9, 2004

Because Cunningham does not disclose a semiconductor device that has a copper bonding pad; and a copper stud with a side surface not contacting a seed layer; and an edge portion of the seed layer overlapping the insulating layer near the window, parallel the bonding pad; Cunningham does not anticipate claim 29.

Applicants respectfully submit that this application is in allowable form; claim 29 distinguishes over the Cunningham reference because Cunningham fails to disclose all elements of limitation in claim 29; and claim 30 has cured the antecedent-defect. Applicants respectfully request that the application be further examined and pending claims timely pass to allowance.

Respectfully submitted,


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